

**CLAIMS:**

1. A three-phase transformer comprising a magnetic circuit and three coil blocks, wherein the magnetic circuit comprises:
  - two spaced-apart, parallel, plate-like elements; and
  - three spaced-apart, parallel column-like elementary circuits, each column carrying the corresponding one of said three coil blocks and serving for the corresponding one of the three phases, wherein the columns are substantially perpendicular to the plate-like elements and are enclosed therebetween such as to form a spatial symmetrical structure about a central axis of the transformer.
2. The transformer according to Claim 1, wherein each of the plates is formed of a strip made of a soft ferromagnetic amorphous alloy.
3. The transformer according to Claim 1, wherein each of the plates is formed of a silicon steel strip.
4. The transformer according to Claim 1, wherein each of the plates has a substantially triangular shape with rounded edges.
5. The transformer according to Claim 1, wherein each of the plates has a substantially circular shape.
6. The transformer according to Claim 1, wherein each of the column-like elementary circuits is in the form of a toroid.
7. The transformer according to Claim 1, wherein each of the column-like elementary circuits is in the form of a stack containing a desired number of axially mounted toroids.
8. The transformer according to any one of Claims 6 or 7, wherein each of the column-like elementary circuits is formed with a radial slot filled with an insulating material.
9. The transformer according to Claim 1, wherein said column-like elementary circuit is in the form of a plurality of vertically aligned strips.

24

*S10  
S10*

10. The transformer according to any one of Claims 6 or 7, wherein the toroid is formed of strips of different widths which alternate along the axis of the toroid, the strips of adjacent layers being displaced from each other along the axis of the toroid in such a manner that the strips of one layer overlap the butts of the strips of 5 the adjacent layer.

11. The transformer according to Claim 7, wherein the column-like elementary circuits are spaced from each other by insulating spacers.

12. The transformer according to Claim 11, wherein the spacers are formed of plastic with filler of a magnetic powder with the concentration of 20-50%.

10 13. The transformer according to Claim 1, wherein working surfaces of the plate-like elements are formed with annular concentric recesses, and butt-end surfaces of the column-like elementary circuits are formed with corresponding projections to be received by the recesses.

14. The transformer according to Claim 13, wherein contacting surfaces of the 15 recesses and projections are coated with insulating materials.

15. The transformer according to Claim 1, having a modular structure, an assembling means being provided for assembling the column-like elementary circuits to the plate-like elements of the magnetic circuit, and for mounting primary and secondary windings of the coil block on the corresponding column-like 20 elementary circuit.

16. The transformer according to Claim 1, wherein each of the column-like elementary circuit is produced from a plurality of ribbon pieces attached to each other and aligned in a parallel relationship along the axis of the elementary circuit.

17. The transformer according to Claim 1, wherein gaps between the plate-like 25 elements and the column-like elementary circuits are filled with a magnetic paste.

18. The transformer according to Claim 7, wherein gaps between the toroids of the column-like elementary circuit are filled with a magnetic paste.

19. The transformer according to Claim 18, wherein the magnetic paste is made of an amorphous powder with soft ferromagnetic properties and a binding 30 insulating material.

20. A method for manufacturing a three-phase transformer, the method comprising the steps of:

- (i) producing two substantially plate-like elements of a magnetic circuit of the transformer from amorphous strips, wherein each of the plate-like elements being produced as a planar toroid of a desired shape by winding at least one amorphous strip about a central hole;
- (ii) annealing each of the planar toroids in a magnetic field, a temperature of the annealing process being up to about 550°C;
- (iii) fixing each of the annealed planar toroids by impregnation;
- (iv) producing three column-like elementary circuits of said magnetic circuit from amorphous strips, wherein each of the column-like elementary circuits is produced as a toroid of a desired height by winding at least one amorphous strip about a central axis;
- (v) annealing each of the column-like toroids in a magnetic field, a temperature of the annealing process being up to about 550°C;
- (vi) fixing each of the annealed column-like toroids by impregnation;
- (vii) forming each of the fixed column-like toroids with a radial slot filled with an insulating material;
- (viii) mounting a coil block on each of the column-like toroids with the slot to form the corresponding one of the three phases of the transformer;
- (ix) mounting the column-like toroids with the coil blocks between the plate-like elements in a spaced-apart parallel relationship of the column-like toroids, such as to form a spatial symmetrical structure about a central axis of the transformer. spacers between the elements of the magnetic

circuit of the transformer being filled with a material containing a magnetic powder.

21. The method according to Claim 20, wherein in step (i) the strip is secured to a mandrel having a triangular cross-section and rotatable about its central axis, 5 and, upon obtaining a desired size of the plate-like element by rotating the mandrel, the element is fixed in the obtained state and excess of the strip is cut off.
22. The method according to Claim 20, wherein the fixing of the planar toroids and of the column-like toroids also includes welding of the ends of the amorphous strips.
- 10 23. The method according to Claim 20, wherein in step (i) several amorphous strips are wound having different widths, the total width of the strips being equal to the desired height of the plate-like element.
24. The method according to Claim 23, wherein the strips in the adjacent layers of the plate-like element are displaced from each other such that the strips of 15 one layer overlap a gap between the strips of the adjacent layer.
25. The method according to Claim 20, wherein in step (iv) each of the column-like toroids is produced by mounting several toroidal elements on top of each other.
26. The method according to Claim 20, wherein in step (iv) said amorphous 20 ribbon strips have different widths, the total width of the strips being equal to the desired height of the toroid.
27. The method according to Claim 26, wherein the strips in the adjacent layers of the toroid are displaced from each other such that the strips of one layer overlap a gap between the strips of the adjacent layer.
28. A three phase transformer comprising a magnetic circuit and three coil blocks, the transformer being manufactured according to the method of Claim 20.